The effect of dietary inclusion of dried chicory roots on Oesophagostomum spp. infections in naturally infected sows

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monchus contortus, but their field efficacy in South Africa requires evaluation. As such, COWP efficacy was evaluated in indigenous goats raised by small-scale farmers in Bergville, KwaZulu-Natal Province.

Individual female goats owned by 15 farmers (15 herds) were monitored for faecal egg counts (FECs) at 4-weekly intervals from the start of the summer rainfall season (October 2007). In January 2008, when FECs were sufficiently high for an FEC reduction test to be carried out, half the goats within each herd were treated with 4g COWP or not. FECs were determined on the day of treatment and 2 weeks later. Mean pre- and post-treatment FECs for the COWP-treated group (n = 73) were 2347 epg and 264 epg, respectively, resulting in a reduction of FEC of 89%. The corresponding FEC values for the untreated controls (n = 66) were 2652 epg and 2709 epg. Pre- and post-treatment faecal cultures showed a prevalence of 72 % and 46 %, respectively, for Haemonchus spp. larvae. The FECs of the COWP-treated goats were similar to the untreated animals 4 weeks after treatment.

The authors propose that COWP may be used for tactical anthelmintic treatment to reduce the expected late-summer peak in FECs in goats raised by these small-scale farmers.

CS9.2

Efficacy of Copper Oxide Wire Particles Against Gastrointestinal Nematodes in Sheep and Goats

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Economic sheep and goat production in the USA is severely hampered by gastrointestinal nematode (GIN) parasitism, particularly Haemonchus contortus. Copper oxide wire particles (COWP) have anti-parasitic properties in the diet of small ruminants, but efficacy of COWP may differ between sheep and goats. In a trial with weaned kids (Kiko x Spanish cross, 6 months old) and lambs (Katahdin or Dorper x Blackface crosses, 5 months old) grazing the same pasture in Central Georgia, half the animals for each species were given 2 g of COWP in a gel capsule, while the other half were given no COWP. Fecal and blood samples were taken from individual animals weekly to determine GIN eggs per gram (EPG) and blood packed cell volume (PCV). Half the animals were slaughtered 28 days post-treatment and adult GIN recovered from the abomasum and small intestines for counting and identification to species. Remaining animals were allowed to graze for an additional 14 d (42 d total). For both sheep and goats, COWP treatment reduced EPG ($P<0.05$), increased PCV ($P<0.05$), and lowered abomasal GIN numbers ($P<0.05$). Reductions in EPG ranged from 75-91% for goats and 83-95% for sheep from days 7-42 of the trial, while numbers of adult H. contortus were reduced by 67 and 86% for COWP-treated sheep and goats, respectively. The COWP treatment was equally efficacious against GIN infection in sheep and goats and is an effective method for controlling these parasites in small ruminants.

CS9.3

Evaluation of Copper Oxide Wire Particles in a Feed Pellet to Control Gastrointestinal Nematodes in Sheep and Goats

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Copper oxide wire particles (COWP) can effectively reduce gastrointestinal nematode (GIN) infection in small ruminants (sheep and goats) when administered in a gel capsule down the throat, but this can be challenging. As an alternative delivery system, COWP were milled into feed pellets and fed to parasitized goats (Kiko x Spanish cross, 15-18 months old), and sheep (Katahdin or Dorper x Blackface crosses, 14 months old) grazing the same pasture in Central Georgia, USA, during spring (Trial 1) and summer (Trial 2), 2008. Only the goats were used in Trial 2 because of low parasite egg counts in the sheep. Half the sheep (Trial 1; n = 8) and goats (Trials 1 and 2; n = 8) received the equivalent of 2 g COWP in supplemental feed over a 24-h period at the start of each trial, while the other half received feed pellets with no COWP. In both experiments, fecal and blood samples were taken weekly for 28 d following treatment to determine GIN eggs per gram (EPG) and blood packed cell volume (PCV). Goats were slaughtered after the second trial and adult GIN recovered from the abomasum and small intestines for counting and identification to species. In Trial 1, COWP treatment reduced EPG ($P<0.05$) in both sheep and goats, with a greater effect in goats, and increased PCV ($P<0.05$) in the goats only. In the second trial with goats only, COWP treatment reduced FEC ($P<0.05$) and total worm count ($P<0.05$), but had no effect on PCV values. Milling COWP into feed pellets made treatment easier and may be an effective alternative delivery method for use of this GIN control technique with small ruminants.

CS9.4

The Effect of Dietary Inclusion of Dried Chicory Roots on *Oesophagostomum* spp. Infections in Naturally Infected Sows

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Introduction: Chicory roots containing easily fermentable dietary carbohydrates (fructans) have been shown to have a negative impact on experimental *Oesophagostomum dentatum* infections in pigs, but chicory roots have never been tested on-farm.

Methods: Two trials (spring and autumn) were carried out in an organic herd targeting naturally infected sows. The spring trial included 1 experimental (n=9) and 2 control (n=7, n=8) groups whereas the autumn trial included 1 experimental (n=10) and 1 control (n=10) group. The experimental groups were given a feed with 35% dried milled chicory roots by substituting part of the cereals days 0-14 and were then returned to the normal (control) feed days 14-41. Strongyle faecal egg counts were monitored regularly. In the autumn, individual larval cultures were set up day 0 for larval differentiation. In addition, faeces from control sows were pooled day 34 for culturing infective larvae that were used to inoculate 2 uninfected pigs that were slaughtered for species differentiation.

Results: The strongyle population consisted entirely of *O. dentatum* (47%) and *O. quadrispinulatum* (54%). Faecal egg excretion was almost completely stopped within 2-6 days on the chicory diet. Return to the control feed resulted in a resumed egg excretion in the experimental groups but overall egg excretion remained significantly lower than for the control groups in both trials.

Conclusions: For the first time a negative effect on *O. quadrispinulatum* by chicory roots has been demonstrated. Chicory may potentially be used strategically to reduce *Oesophagostomum* spp. infections in organic sow herds.

CS9.5

Counterintuitive Temperature-Driven Effects of Climate Change on Gastrointestinal Nematodes

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The first papers on likely effects of temperature increases on parasite epidemiology have been published. Reports indicate increases in development rates as well as extensions of windows of opportunity for parasite transmission. However, higher temperatures are likely to also impact negatively on parasite survival. This may not only lead to unexpected seasonal alterations in parasite epidemiology but also to shifts in the relative importance of economically important parasite species.

Here we explore likely effects of climate change on the epidemiology of Teladorsagia cirumcincta, Trichostrongylus colubriformis and Haemonchus contortus in temperate regions in a simple, temperature-driven, R0-based model. In the absence of host immunity, the model predicts the expected pattern of increased overall abundance and expansion of transmission windows for H. contortus. However, for T. circumcincta and T. colubriformis, a more unexpected seasonality change, a delayed start to higher levels of predicted transmission success in spring and early summer and a more 'peaked' parasite abundance in late summer and spring, is predicted. A validation process, comparing model output to a 30-year UK surveillance data set, shows that the model reflects recently observed trends very accurately. This underlines the potential of such simple models for the study of the effects of climate change on parasites. The results suggest that immune systems of hosts may not necessarily nullify an increased force of infection at pasture. Changes in seasonality of these parasites are likely to lead to adaptations of their over-winter strategies.

CS10 - Genomics / Functional Genomics

Monday, August, 10, 2009

CS10.1

Molecular Characterization of Theileria Species of the Africa Buffalo (Syncerus caffer) by 18S rRNA Gene Sequence Analysis

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The African buffalo (Syncerus caffer) is the natural reservoir host of both pathogenic and non-pathogenic Theileria species. Corridor disease, caused by Theileria parva, is a controlled disease in South Africa. Theileria parasites usually occur as mixed infections in infected animals, and although the non-pathogenic forms do not have any significant economic importance, their presence interferes with the diagnosis of T. parva. In this study, the phylogenetic relationship of pathogenic and non-pathogenic Theileria species obtained from buffalo blood samples originating from different geographical regions in South Africa were investigated using 18S rRNA gene sequences analysis. DNA was extracted, the V4 hypervariable region of the 18S rRNA gene was amplified and subjected to the Reverse Line Blot (RLB) hybridization assay using Babesia and Theileria genus- and species-specific probes. Results of the RLB revealed the presence of the pathogenic T. parva, benign T. mutans, and the non-pathogenic T. velifera, T. buffeli and Theileria sp. (buffalo). In some samples, the PCR products hybridized only with the genus-specific probes, and not with any of the species-specific